2672

AMENDMENT TRANSMITTAL LETTER (Large Entity)

Applicant(s): **Rafail GLATMAN**

Docket No. **10056/002001**

Serial No.	Filing Date	Examiner	Group Art Unit
09/954,885	September 18, 2001	Javid A. Amini	2672

Invention: **METHOD FOR COMPUTER MODELING OF VISUAL IMAGES AND WAVE PROPAGATION**

TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith is an amendment in the above-identified application.

The fee has been calculated and is transmitted as shown below.

CLAIMS AS AMENDED

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST # PREV. PAID FOR		NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS	18	-	20	=	0	x $18.00	$0.00
INDEP. CLAIMS	2	-	3	=	0	x $86.00	$0.00
Multiple Dependent Claims (check if applicable) ☐							$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT							$0.00

☒ No additional fee is required for amendment.

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- ☒ Any additional filing fees required under 37 C.F.R. 1.16.
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#45,079

Signature

Dated: 11/20/03

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Rafail Glatman	Art Unit :	2672
Serial No.:	09/954,885	Examiner :	Javid A. Amini
Filed :	September 18, 2001		
Title :	METHOD FOR COMPUTER MODELING OF VISUAL IMAGES AND WAVE PROPAGATION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY UNDER 37 CFR § 1.111

In response to the Office Action dated September 12, 2003, please reconsider the application in view of the following remarks. Applicant thanks the Examiner for carefully considering this application

Disposition of Claims

Claims 1-18 are pending in this application. Claims 1 and 14 are independent. The remaining claims depend, directly or indirectly, from claims 1 and 14.

Rejection(s) under 35 U.S.C § 112

Claims 6 and 19 stand rejected under 35 U.S.C. § 112 ¶1 for failing to comply with the enablement requirement. Specifically, the Examiner asserts that the claims were not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. This rejection is respectfully traversed.

"The test for enablement is whether one reasonably skilled in the art could make or use the invention from the disclosure in the patent coupled with information know in the art without undue experimentation." *United States v. Teletronics Inc.*, 857 F.2d 778,785 (Fed. Cir. 1988); MPEP §2164.01. Further, "[a] patent need not teach, and preferably omits, what is well known in the art." *In re Buchner*, 929 F.2d 660,661 (Fed. Cir. 1991); MPEP §2164.01. The Applicant respectfully asserts that the elements of claims 6 and 10 cited as lacking enablement satisfy the aforementioned legal tests. Specifically, the terms used in the rejected claims are either supported by the specification or well known in the art. Each question posed by the Examiner on pages 9-10 of the action is addressed separately below.

1. How does the following element work: "subdivid[ing] an initial wavefront emanating from the particular source into front elements such that a particular front element impinges on a particular boundary element that is visible from the particular source?"

   The aforementioned phrase encompasses the idea that an initial wavefront exiting from a particular source may be sub-divided such that a given portion of the initial wavefront (*i.e.,* an element of the initial wavefront) may intersect, or impinge on a particular boundary. The Applicant respectfully asserts that a person skilled in the art would understand this phrase to mean determining the intersection of two functions – one function representing a visibility border, and a second function representing the direction of propagation of the front element. Further, the visibility functions are split into sub-ranges such that the first two derivatives preserve the signs of the function, rendering this calculation

straightforward. (*See, e.g.*, Specification paragraph [0024]).

2. How does the following element work: "determin[ing] a projection of the particular front element onto the particular boundary element, for each front element?"

A projection of a particular element onto a boundary element is determined by selecting each point of a front element and drawing a line extending from that point in the direction in which the front element is moving (note the direction information is a part of how a front element is defined) and terminating when the line intersects a boundary element (to obtain an intersection point). The combination of all the intersection points together represents the front "projection" on the boundary element. The Applicant respectfully asserts that "projections" in this context are well known in the art and determining a "projection" is accordingly, adequately enabled in the specification. (*See, e.g.*, Specification paragraphs [0039]-[0040]).

3. How does the following element work: "determin[ing] whether any of the reflected or refracted front elements impinge on any of the receivers"?

Similar to a method in which a projection is determined, once a framework for describing the initial position and direction of a particular front element is established, the determination of whether a portion of a reflected or refracted front element impinges on a receiver may be determined by simply searching for an intersection point between the two functions. The Applicant asserts that the determination of an intersection between two lines (in a 2-dimensional framework or a 3-dimensional framework) is well known in the art and adequately enabled in the specification. (*See, e.g.*, Specification paragraphs

[0039]-[0040]).

4. How does the following element work: "determin[ing] a particular ray path between a particular receiver and the particular source, for each front element that impinges on any of the receivers?"

Similar to a method in which a projection is determined, once a framework for describing the initial position and direction of a particular front element and for describing the visibility range of the receiver is established, the determination of a particular ray path between a particular receiver and source may be determined by simply searching for an intersection point between the two functions. The Applicant asserts that the determination of an intersection between two lines (in a 2-dimensional framework or a 3-dimensional framework) is well known in the art and adequately enabled in the specification. (*See, e.g.,* Specification paragraph [0040]).

5. How does the following element work: "comput[ing] physical parameters based on the particular ray path, for each particular ray path?"

Physical parameters, include, but are not limited to travel time, amplitude, energy, and phase changes during the reflections and refractions, etc. Travel time is calculated using the length of the ray path (determined from using the end point coordinates of the ray path), the velocity in each medium (this parameter is one of the input parameters, *see, e.g.,* "medium parameters" 26 in Figure 2), and the well-known equation velocity=displacement/time. The remaining physical parameters (*e.g.,* the amplitude, energy, and phase changes during the reflections and refractions) are calculated based on well-known equations of optics or

acoustics. The Applicant asserts that the determination of physical parameters associated with a ray path is well known in the art, and adequately enabled in the specification. (*See, e.g.,* Specification paragraphs [0039]-[0040]).

6. How does the following element work: "determin[ing] all boundary elements on which the reflected and refracted front elements emanating from the particular boundary element will impinge, for each front element?"

Refer to the response to question 1 above.

7. How does the following element work: "subdivide the reflected and refracted front elements that impinge on more than one boundary element into subdivided front elements such that each subdivided front element impinges on a single boundary element?"

Refer to the response to question 1 above.

8. How does the following element work: "a particular subdivided front element and its associated boundary element instead of the particular front element and the particular boundary element, for each subdivided front element, until all subdivided front elements are either eliminated or no longer impinge on any boundary?"

The aforementioned phrase encompasses the recursive nature of the processing shown, for example, in Figure 5. Specifically, when a front element impinges on an object boundary, sub-divided front elements (technically, zero or more sub-divided front elements; up to 4 in the case of seismic waves) are generated, and the subsequent propagation of sub-divided front elements is traced until they are eliminated (usually due to decrease in energy below a pre-

determined threshold) or no longer intersect with any boundary. In view of the above, the Applicant asserts that this phrase is adequately enabled in the specification. (*See, e.g.,* Specification paragraphs [0039]-[0040]).

In view of the above, the claims are adequately enabled. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection(s) under 35 U.S.C § 102

Claims 1-7 and 14 stand rejected under 35 U.S.C. § 102 as anticipated by U.S. Patent No. 6,226,053 ("French"). This rejection is respectfully traversed.

Claim 1 is directed to a method for modeling visual images and wave propagation. Embodiments of the present invention, provide a method for more accurately modeling wave propagation through different media (*i.e.,* different materials such as rock formations, etc.). Specifically, the method recited in claim 1 includes describing a scene mathematically, processing source and receiver information, calculating visibility areas, tracing wavefronts, and displaying the results.

In contrast, French is generally directed to a method for managing media production using a media production system (*see,* French, Figure 1) and software for organizing the various types of media (*i.e.,* audio, visual, etc.) Specifically, French discloses a method for representing a visual scene as a directed acyclic graph of data and operators that generate a sequence of image frames over specified time intervals. However, French fails to teach or suggest the invention as recited in claim 1.

Specifically, French fails to teach or suggest "processing source and receiver information." The processing of source and receiver information taught by French in

Figure 3A and 3B refers to processing of information from physical sources and receivers (*i.e.,* sound boards, etc.). However, sources and receivers in the context of claim 1 correspond to arbitrary positions (specified using two-dimensional or three-dimensional coordinate systems) from which wave fronts emanate from and are received at respectively. (*See, e.g.,* Specification [0029] and [0030]).

Further, French fails to teach or suggest "calculating visibility areas" as recited in claim 1. The portion of French which the Examiner asserts teaches the calculation of visibility areas, in fact, only describes that visibility may be used as a "simple parameter" (French, col. 16, line 66), and does not teach or suggest any method to calculate the visibility.

Furthermore, with respect to the assertion that steps (d) and (e) are inherent in the disclosure of French, the Applicant respectfully refers to MPEP § 2112, which states, "[t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic." *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). Additionally, MPEP §2112, citing *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999), sets forth that

> [t]o establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is ***necessarily present*** in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' (emphasis added)

Finally, MPEP §2112, citing *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990), states that

> In relying upon the theory of inherency, the examiner must provide a

> basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. (emphasis in original)

Accordingly, objective evidence or cogent technical reasoning to support the conclusion of inherency must be provided by the Examiner if the assertion that steps (d) and (e) are inherent is maintained.

In view of the above, French fails to show or suggest the present invention as recited in independent claim 1. Thus, independent claim 1 is patentable over French. Further, independent claim 14 recites similar elements as amended independent claim 1, and thus is patentable over French for at least the same reasons discussed above with respect to independent claim 1. Furthermore, dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection(s) under 35 U.S.C § 103

Claims 8-13 and 15-18 stand rejected under 35 U.S.C. § 103 as obvious over French in view of U.S. Patent No. 6,476,805 ("Shum"). This rejection is respectfully traversed.

Shum is directed to a technique for determining spatial displacement estimation and multi-resolution operations on light fields. However, Shum fails to disclose what French lacks. Specifically, Shum does not teach or suggest describing a scene mathematically, processing source and receiver information, calculating visibility areas, tracing wavefronts, and displaying the results as recited in claim 1 or 14 of the present application.

Accordingly, French and Shum, whether considered separately or in combination,

cannot render claim 1 or 14 obvious for the same reasons described above with respect to claim 1. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 10056/002001).

Respectfully submitted,

Date: 11/20/03

#45,079

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